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Herman Otto – The Method for Ornithophaenology inaugurated by the Hungarian Central Office of Ornithology – 1905

D. S. Palmer
May 26, 1906.

MAGYAR ORNITHOLOGIAI KÖZPONT
HUNGARIAN CENTRAL OFFICE OF ORNITHOLOGY

THE METHOD FOR ORNITHOPHAENOLOGY

INAUGURATED BY THE

HUNGARIAN CENTRAL OFFICE OF ORNITHOLOGY

BY

OTTO HERMAN
LATE M. P. CHIEF OF THE HUNGARIAN CENTRAL
OFFICE OF ORNITHOLOGY.

BUDAPEST,
PRINTED BY VIKTOR HORNYÁNSZKY, BUDAPEST
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With the Author's compliments.

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THE METHOD.

The ever-increasing mass of data — called a „Wust" (chaos) by A. v. Middendorff * so far back as 1855 — concerned with the migration of birds, make the question of their working out one of the first importance. Yet it cannot be denied that everybody has attempted to avoid tackling the „Wust": in fact we must admit that the one aim held in view and the results even of the agitation started by the International Ornithological Congress in Vienna (1884) has always been the amassing of still more data.

The questions to be decided are:

1. whether the „Wust" is of any value; and, if so, what use can be made of the same?

2. in what way recent data are to be treated?

3. whether a uniform method should be followed in working out the data; and, if so, which method?

Up to the present no-one has attempted to wrestle with these cardinal questions.

Authors have indeed launched into axioms more or less ingenious, which, however, without ever surpassing those deduced by the crowned „auceps" the Emperor Frederick II. (1194—1250) as far back as the XIII-th century, often fail to reach their level.**

The intense work which, in the interests of the second International Ornithological Congress held at Budapest in 1891, I had to

* A. v. Middendorffs Isepiptesen Russlands 1855.

** See my „Recensio critica automatica of the doctrine of bird migration 1905."

accomplish in the field of Ornithophaenology, brought me face to face with the three questions above mentioned and I determined to „take the bull by the horns“ and to settle the question of method, at least in its general outlines.

It is quite natural that I could not even think of working out the whole of the enormous material known, but it occurred to me that the material relating to Hungary could be sifted and that thus there was a possibility of getting this latter at least in order.

Assuming that the Congress held in 1891 was, for Hungary, a turning-point, I called all data gathered previous to 1891 *historical data*, while those which were methodically collected for the Congress, I assumed as *recent data* which could be treated side by side with the historical ones.

The other points of view were the following: I assumed the migration of birds to be a true phaenological phenomenon, organically connected with Meteorology, so that in Ornithophaenology, too, the geographical coordinates afford a firm ground; that further the hypsometrical conditions — height above the level of the sea — and the orographical features as a whole must be taken into account; that in observation the chief stress must be laid upon the most salient palpable moments, viz. earliest arrival, latest arrival, earliest departure, latest departure; that the time difference between the two must be considered as fluctuation; and that the mean figures established by this method will throw light upon the whole area under observation and the mutual relation existing between the different points of observation.

It at once occurred to me that the relative differences of various areas would be perceptible also and would be more pronounced according to the relative distances of the same, a fact which is proved by the migration of birds as a phenomenon of movement; that also the relations between different areas will be recognizable in such a way and that the difference would be the more apparent, the farther they are one from the other.

I had no doubt that the conditions in Hungary would come out plainly, because the country is excellently articulated, it being split up into one vast plain, one vast hilly portion (Transdanubian district), one large plateau (Transylvania) and an extensive Alpine district (Northern Hungary), thus a whole consisting of clearly defined parts.

It was evident to me that if all the areas of Europe were to work out their material according to a uniform method, we could obtain a positive substratum which would throw much light upon the phenomenon of the migration of birds.

By dividing the material into *historical* and *recent*, there was a possibility of ascertaining the value of MIDDENDORFF's „Wust" (chaos) which was and is still of the greatest interest for science.

So, in 1891, I adopted and applied the following method:

HISTORICAL DATA

Chimney Swallow (Hirundo rustica L.)

Martius	20.	Sopron	1881,	Aprilis	3.	Ghymes	1876,
„	24.	N.-Enyed	1882,	„	3.	Ghymes	1888,
„	24.	N.-Enyed	1889,	„	3.	Ghymes	1890,
„	25.	Fogaras	1882,	„	4.	Medgyes	1860,
„	26.	Fogaras	1889,	„	4.	Kőszeg	1880,
„	27.	N.-Enyed	1885,	„	4.	Ghymes	1879,
„	27.	Velencze	1887,	„	4.	Ghymes	1883,
„	27.	Medgyes	1862,	„	4.	Medgyes	1860,
„	28.	N.-Enyed	1888,	„	4.	Medgyes	1861,
„	28.	Sz.-Fehérvár	1886,	„	4.	N.-Enyed	1883,
„	29.	Miskolcz	1852,	„	5.	Mező-Záh	1868,
„	30.	Tisza-Roff	1849,	„	5.	N.-Enyed	1887,
„	30.	Gyeke	1867,	„	5.	Igló	1883,
„	30.	Budapest	1881,	„	6.	Fogaras	1887,
„	30.	Fogaras	1884,	„	6.	Szt-Margit	1889,
„	31.	Pozsony	1885,	„	6.	Ghymes	1875,
„	31.	Kőszeg	1878,	„	6.	Ghymes	1886,
„	31.	Sz.-Fehérvár	1889,	„	6.	Rozsnyó	1866,
„	31.	Sopron	1884,	„	6.	Sopron	1882,
„	31.	Rozsnyó	1869,	„	6.	Budapest	1887,
Aprilis	1.	N.-Sz.-Miklós	1882,	„	6.	Okka	1889,
„	1.	Pozsony	1886,	„	7.	Ghymes	1880,
„	1.	Fogaras	1890,	„	7.	Ghymes	1887,
„	2.	Sz.-Fehérvár	1883,	„	7.	Budapest	1880,
„	2.	Kőszeg	1885,	„	7.	Sopron	1889,
„	2.	Velencze	1889,	„	7.	Rozsnyó	1867,
„	3.	N.-Enyed	1886,	„	7.	Rozsnyó	1868,
„	3.	Tisza-Roff	1850,	„	8.	Kőszeg	1877,
„	3.	Fogaras	1888,	„	8.	Ghymes	1873,
„	3.	Miskolcz	1852,	„	8.	Ghymes	1877,
„	3.	Sopron	1883,	„	8.	Ghymes	1885,

Aprilis	8,	N.-Enyed . .	1848,	Aprilis	13.	Zilah	1882,
„	9.	Fogaras . . .	1886,	„	13.	Pozsony . . .	1889,
„	10.	Rozsnyó . . .	1867,	„	13.	Sz.-Béla . . .	1881,
„	10.	Kőszeg . . .	1887,	„	14.	Kolozsvár . .	1881,
„	10.	Budapest . .	1879,	„	16.	Ghymes . . .	1878,
„	11.	Ghymes . . .	1881,	„	16.	Rozsnyó . . .	1870,
„	11.	Fogaras . . .	1885,	„	17.	Szepes-Béla . .	1888,
„	11.	N.-Enyed . .	1884,	„	17.	Medgyes . . .	1859,
„	11.	Ghymes . . .	1884,	„	18.	Oravicza . . .	1882,
„	12.	Szep.-Béla . .	1885,	„	19.	Ghymes . . .	1882,
„	12.	Ghymes . . .	1874,	„	21.	Szep.-Béla . .	1889,
„	12.	Ghymes . . .	1889,	„	23.	Szep.-Béla . .	1884,
„	13.	Medgyes	1863,	„	24.	Diód	1853.

Of these points:

Oravicza	49° 18′	37° 25′	793 m.	is the northernmost
Fogaras	45° 51′	42° 38′	430 m.	the southernmost
Kőszeg	47° 23′	34° 12′	274 m.	the westernmost
Fogaras	45° 51′	42° 38′	430 m.	the easternmost

The difference in time (time-difference) resulting from these data led me to apply the following method, which produced a formula and a mean figure.

The compilation of the historical data extending over a period of 88 years led to the establishment of the following *country formula* (i. e. formula for the whole country generally) which relates to the first appearance of the chimney-swallow (hirundo rustica), in the places mentioned, during a period from 1848—1890.

The chimney swallow appeared:

earliest date: 20th March, 1851 at Sopron;
latest date: 24th April, 1883 at Diód;
difference: 36 days;
mean date: 7th April;
arrivals in March: 20 times;
„ „ April: 70 times;
characteristic period: first half of April.

One is struck by the day data, according to which the arrival took place 4 times on March 30th, 5 times on the 3rd, 6 times on the 4th, 8 times on the 6th of April etc., at different points, it is true, and also in different years, facts which naturally excluded any combinations being made therefrom.

The establishment of the formula and the determination of the mean figure resulted from the following procedure: the limits of fluctuation were March 20th and April 24th i. e. a difference of 36 days; of this the half is 18 days; if we reckon 18 days from March 20th, April 7th is obtained as mean date.

In accepting the two extreme dates — March 20th and April 24th — I took care that every *intermediate* date should be represented and that consequently every date should be taken into consideration in making the calculation.

I would merely remark here that the country mean figure, as phaenologically established by our Meteorôlogist J. Hegyfoky in „Aquila" vol. XI. 1904 on the basis of 10,053 recent data, is also April 7th.

RECENT DATA FROM 1890.

Observation inaugurated on the occasion of the Congress.
Formula drawn from the data of Ornithologists 1890.

Earliest arrival: 15th March, Horgos (87 m. above s. l., plain).
Latest arrival: 15th April, Zuberecz (700—1300 m. above s. l., subalpine).
Difference: 32 days.
Mean date: 30th March

Regarding this mean it is to be remarked that it is based upon the records of 17 stations only, but the influence of height is obvious.

Formula based on the data of the Royal Forestry Offices 1890.

Hypsometrically:

Earliest arrival: Szeged 18th March, 84 m. above s. l., plain.
Latest arrival: Dámes 21th April, 1328 m. above s. l., alpine.
Difference: 35 days.
Mean date: 5 April.

Geographically:

Ogradena, southernmost: 19th March, 44° 40′ N.L.
Turdossin, northernmost: 8th April, 49° 2 ′ N.L.
Difference: 21 days.
Mean date: 30th March.

It appears, therefore, that the mean date calculated upon the hypsometrical elements furnished by a fairly reliable system yield a mean figure — 5th April — which comes very near the country mean figure 7th April. The geographical elements, however yield a widely divergent mean figure: the 30th March. The reason is that

the northernmost point made an erroneous observation, because April 8th is too *early* for Turdossin and if we substitute here the date of the adjacent Zuberecz — April 15th — we shall find *April 5th* to be the mean figure in this case also. Consequently this method may be used for the perception of errors also.

This proves the great influence of height and geographical latitude of the place or area of observation, as well as the fact that it is not the power of flight that is decisive in migration, but other factors, viz. as this method has already proved, meteorological conditions and biological reasons, above all sexual impulse.

The difference between 1890 and 1891 has already received a meteorological explanation.*

By the aid of this method I undertook to determine, — as far as the data at my disposal concerning the migration of the Hirundo rustica would allow, — at least the outlines of the interzonal features of the migration in question.

I began with Knysna in Africa, 32°0′ S. L. and went as far as Spitzbergen in Europe, 80°0′ N. L. and the part extending East as far as Kamtchatka.

Knysna, acc. to Catalogue of Brit. Mus. . . .	2nd January
Quilimane, 17°0′ S. L. acc. to Reichenow . .	19th „
Victoria Nyanza 0°0′ „ „ „ . .	2nd March
For Europe the earliest arrival was:	
Murcia, 38°0′ N. L.	15th February
Italy, mean date acc. to Gigliolis' indications .	14th March
Germany, mean date out of means	16th—17th April
England, mean date.	24th—25th April
Luleâ, mean date based on records of 21 years .	26—27 May
Western Finland, acc. to Middendorff. . . .	11th June**

From the acceptable data Murcia-Luleâ it follows that the chimney-swallow needs on an average 92 *days* to settle in this area,*** whereas, considering the velocity of her flight — from 20, to 65 metres a second — she should require less than 92 *hours* to cover this distance: a direct proof that the progression is dependent upon another factor, viz. *the course of the isotherms,* as Hegyfoky later

* Vide O. Herman: „Die Elemente des Vogelzuges in Ungarn etc. 1895".

** For the whole series see „Aquila" I. 1894. p. 12—19.

*** Rectified ultimately on the base of the observations of Gibraltar to 105 days; vide „Recensio" p. 21.

on proved; consequently we may say that the chimney-swallow on her spring journey from South to North travels so to say with the spring.

This was the original, purely ornithological method, which, though void of some phaenological conditions, nevertheless proved that Middendorff's „Wüst" (chaos) may be worked out methodically, especially if the data at hand from one and the same year are worked out according to a uniform method, that is, if these data are turned into migration-elements and combined comparatively, as is quite naturally done with the exact elements, the figures and time-data, that serve as a basis.

Present method.

The result of the meteorologist Jacob Hegyfoky's joining the Hung. Central Office was the further development of method in the form of a uniform ornithological and meteorological schematisation, observation and working out, the principles adopted being:

1. Observation of the first appearance and last *visibility*, as formerly.

2. *Two systems were put in action*, one consisting of professional ornithologists, the other of schooled foresters.

3. The latter had only to notify the movements of the chimney-swallow and the stork, the ornithologists of everything.

4. The data coming in were looked through critically and turned into elements in the following way:

836—1901 Manuscriptum a

D. Kaygorodoff

CUCULUS CANORUS

Mai 11. 1901

Ust Syssolsk

Lat. sept. 61°48′

Long. ab Ferro 68°31′

Alt. 50 m. Rossia

5. These data were worked out on the base of the geographical net and each degree of latitude was divided in two halves — zones; the elements were distributed on the squares thus obtained, and combined. This procedure was called the „Zonesystem“ and it served as a basis for the meteorologist also.

6. In order to establish all possible uniformity, the mean date mere taken as average ones and that in such a way that the totality of data was added up and the mathematical mean taken.

The formula applied is the following: if a_1, a_2, a_3 . . . a_n are the data and n their number, the mean results from the formula

$$\frac{a_1 + a_2 + a_3 + \ldots a_n}{n}$$

7. The meteorologist worked on the basis of the weather charts of Europe and the special reports issued for Hungary.

8. As the geographical starting point was of great importance for the progression of the advance, the H. C. O. accepted the *meridian of Ferro*, for the simple reason that its line does not intersect any of the European countries and consequently none of them are severed off; on the contrary the meridian of Greenwich cuts off one part of England, even London, the western part of France and the whole Iberian penninsula. From Ferro the whole eastern progression can be counted *uninterruptedly*, a fact which renders matters much more simple.

At the meeting held in 1899, at my initiative, at Sarajevo, Hungary, Austria and the occupied provinces of Bosnia and Herzegovina came to an arrangement, which only the H. C. O. carried out without intermission.

As a matter of course, the weather, the culmination, the direction of flight taken by the masses were to be indicated as far as possible.

In order to determine whether the advance is made in a broad front or on definite limited roads, an observation en masse of the chimney-swallow was carried out in Hungary in 1898.

Besides the ordinary system at the disposal of the H. C. O., the masters of elementary schools were recruited; the results were, for the spring of 1898 not less than 5903, and for the autumn of the same year not less than 2366 data.

Sample of a post-card sent post free and used for reporting an observation.

Portómentes az 1897. évi 76.788. számú kereskedelemügyi miniszteri rendelet alapján.

Magyar

Ornithologiai Központ

BUDAPEST

VIII., Nemzeti Muzeum.

Obverse:

To the Hungarian Central Office of Ornithology
Budapest.

Reverse:

Chimney-swallow — Hirundo rustica
Spring 1898. first swallow arriving:

At extravillan . . . . . .
At intravillan . . . . . .
At the house . . . . . .
Breeding . . . . . .
Datum . . . . . .

N. N.

County
District

The indications supplied by these cards were subsequently turned into elements. The annexed map shows the distribution of observing stations in 1898.

Each dot indicates a locality, the geographical and hypsometrical position and the observer, and is therefore a complete element.

The network was close, but not quite even, because the Saxons and Rumanians did not take part; also Croatia stood aloof.

Upon receipt of these post-cards the information supplied was turned into elements, by determination of the latitude, longitude, and altitude, then arranged according to dates and each day schematized on a specially prepared map of Hungary in its respective square. Thus 54, or rather 56 day-maps were prepared and the number of dots entered showed exactly the beginning, the

increase, the culmination, the decrease, the rear-guard and the end of the phenomenon as shown by the General map of the 5903 stations of the year 1898 (v. annexed Tab. I; and II—VIII the day maps showing the beginning on March 10th and end on May 2nd).

The great lesson drawn from this by no means easy work was, for Hungary at least, that, as far as the chimney-swallow is concerned, there can be no talk of either broad front or of defined routes of migration, but that the settling of an area is very similar to the action of the sower who scatters the seed with his hand. Probably under the influence of sexual impulse some individuals rushed on in advance, but an evident successive pushing on till the northern alps took place only after culmination, towards April 23rd.

Fig. 1.

On the ground of this observation, Hungary was, in 1899, divided into four migration areas shown on the annexed map IX and the schema of the map — Fig. 1. — with the distribution of the four migrational regions:

I. Plain, earliest arrival.
II. Transdanubian district, early arrival.
III. Transylvanian plateau, later arrival.
IV. Northern Alps, latest arrival.

This division of the country has held good in every respect and yields a fair basis for combinative treatment. Of the whole method only the mean data from the zones will have to be elimi-

nated, because each zone shows differences hypsometrically greater or less, by which the uniformity of the data is influenced.

A further development of this method is furnished by the maps, the drawing of which was initiated by J. Schenk on the basis of the foresters' observations. Each of these maps (Tab. X. A and 1—5.) shows the spreading of one species of birds during the colonisation of a certain area in spring, at the same time characterising the distribution of this species. The limits correspond with A. v. Middendorff's isepipteses, as schematised by this enquirer on his maps.

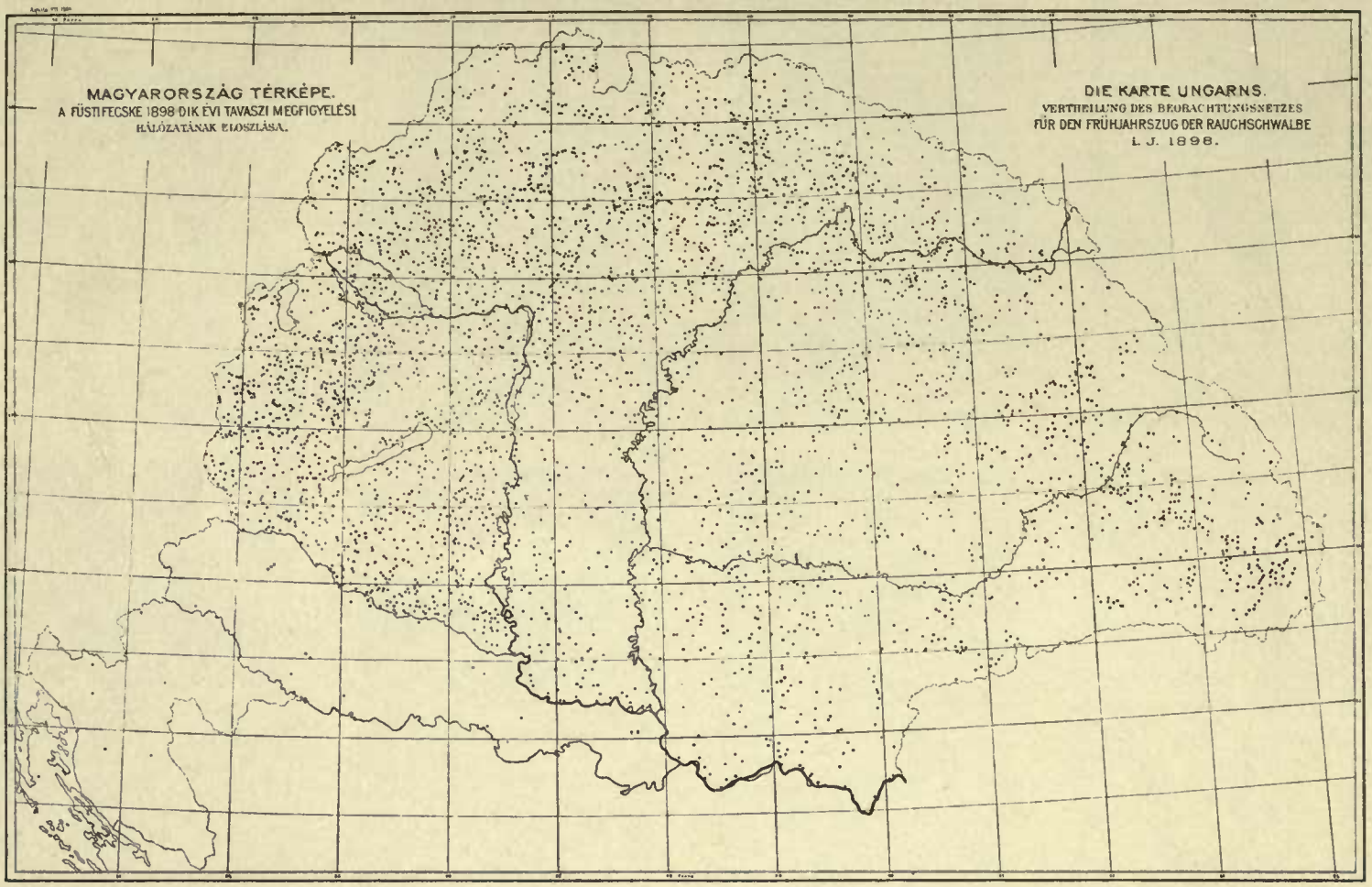
The progression of the spreading in spring:

Tab. X. 1. of the Chimney Swallow: S. — N.
„ „ 2. of the Wagtail W. — E.
„ „ 3. of the Cuckoo S. E. — N. W.
„ „ 4. of the Stork S. E. — N. W.
„ „ 5. of the Woodcock S. W. — N. E.

As clearly proved in the course of this sketch of our method, a progressive deepening of our knowledge of bird migration is evident and puts Hungary certainly at the head of all countries where such observations are made, furthermore, it is apparent, that in such a way many a „puzzle“ might be solved and many „marvels“ might be explained in a perfectly natural way; but, on the other hand, it is equally manifest that the phenomenon of migration in its progress can only be recognised on the basis of interzonally organised cooperation.

Without any knowledge of the wintering places of our birds of migration, without sufficient knowledge of all the areas of the palaearctic and arctic zone in their mutual relations, the result of even the best-worked area will always remain a mere fragment, at the best only a hint.

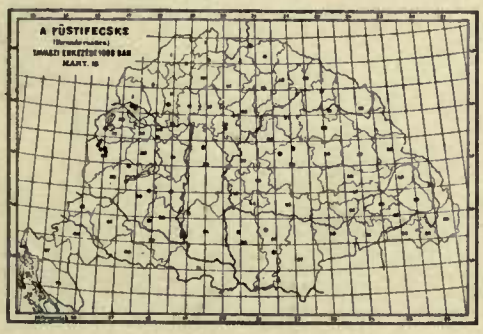
If, however, we succeed in prevailing on at least the European railway-stations to observe the migration of the chimney-swallow as was done in Hungary in 1898, we shall be on the eve of solution.



GENERAL MAP OF HUNGARY

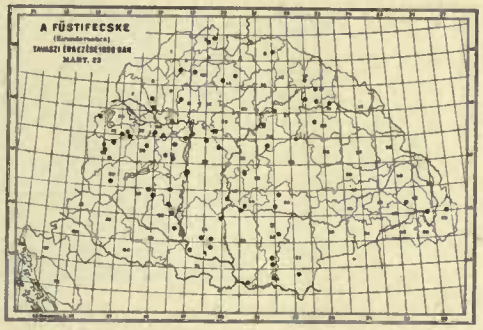
showing the 5903 stations for the observation of the Spingmigration of Hirundo rustica, 1898.

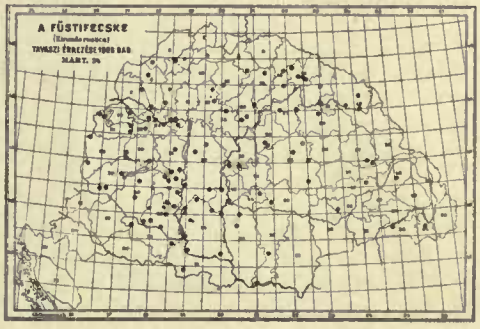
Martius 10. Beginning.



Spring Migration of the Ch. Swallow. 1898.

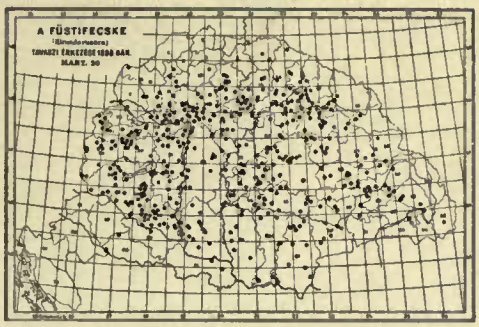
Martius 20. Progression.

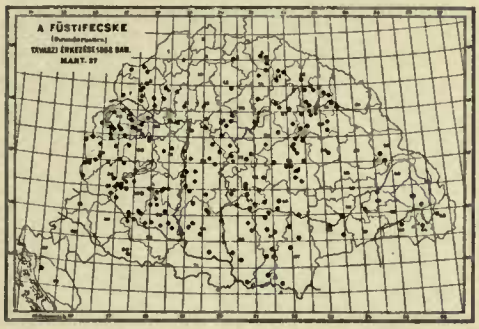


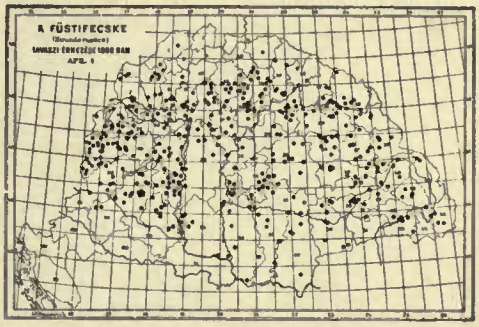


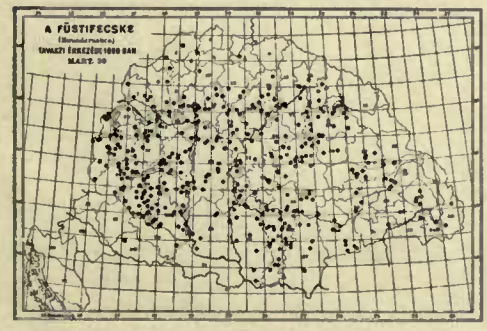
Spring Migration of the Ch. Swallow. 1898.

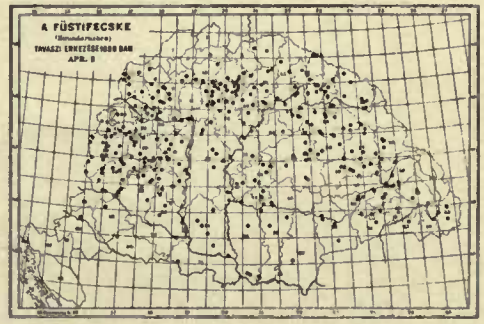
Martius 27—31. Culmination.





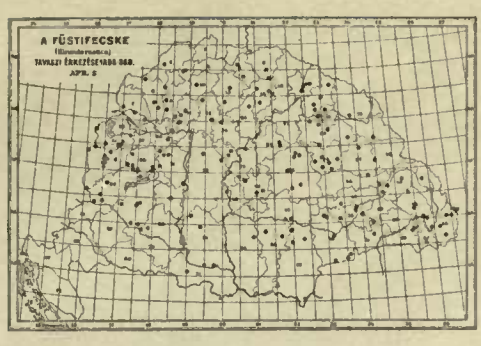


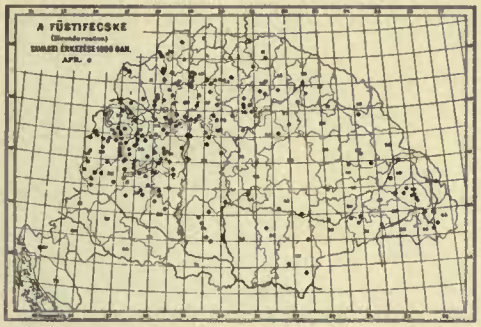


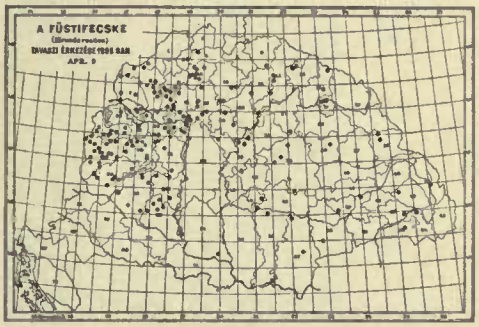


Spring Migration of the Ch. Swallow. 1898.

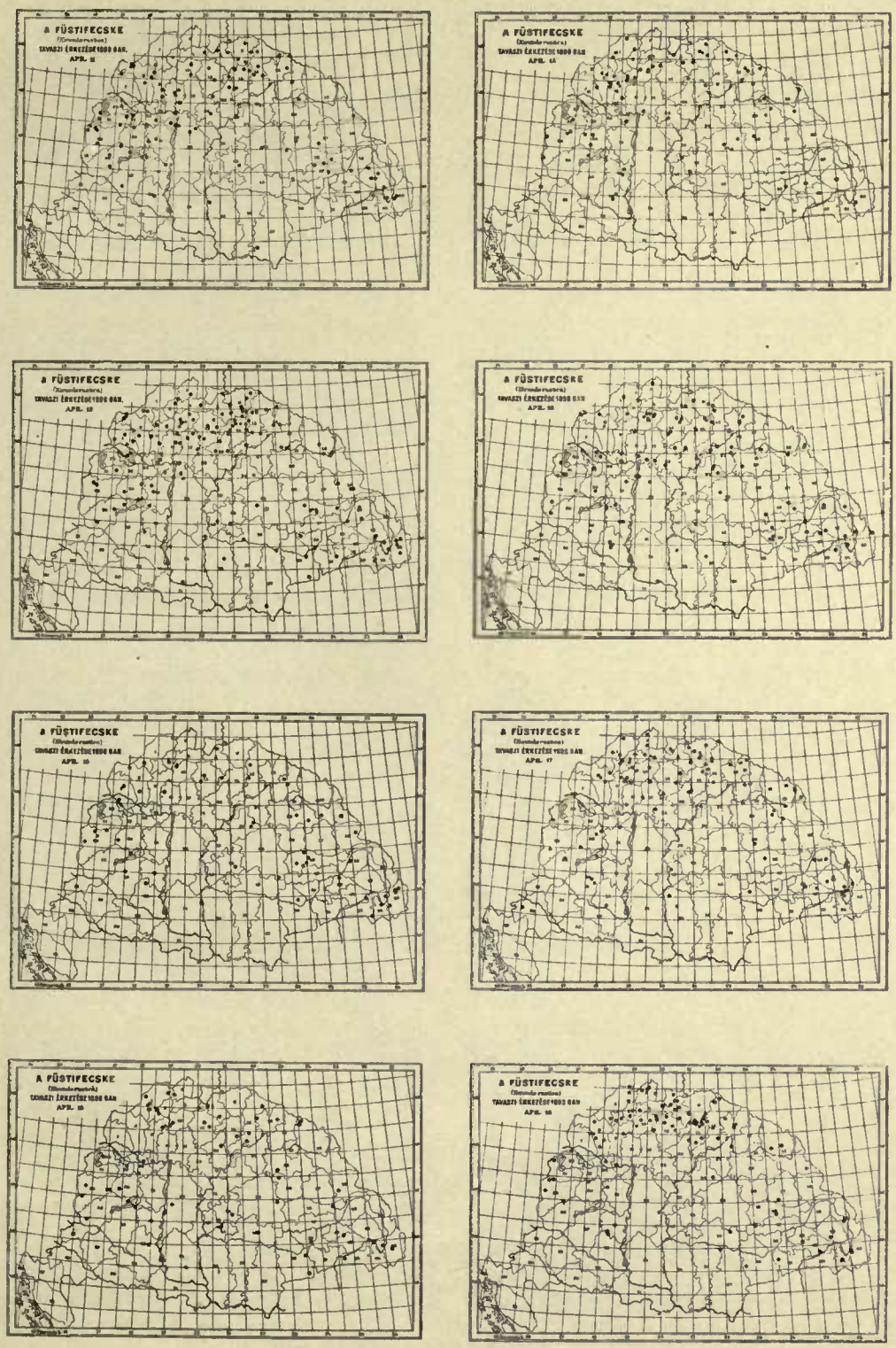
Aprilis 6—9. Rearguard.







Spring Migration of the Ch. Swallow. 1898.



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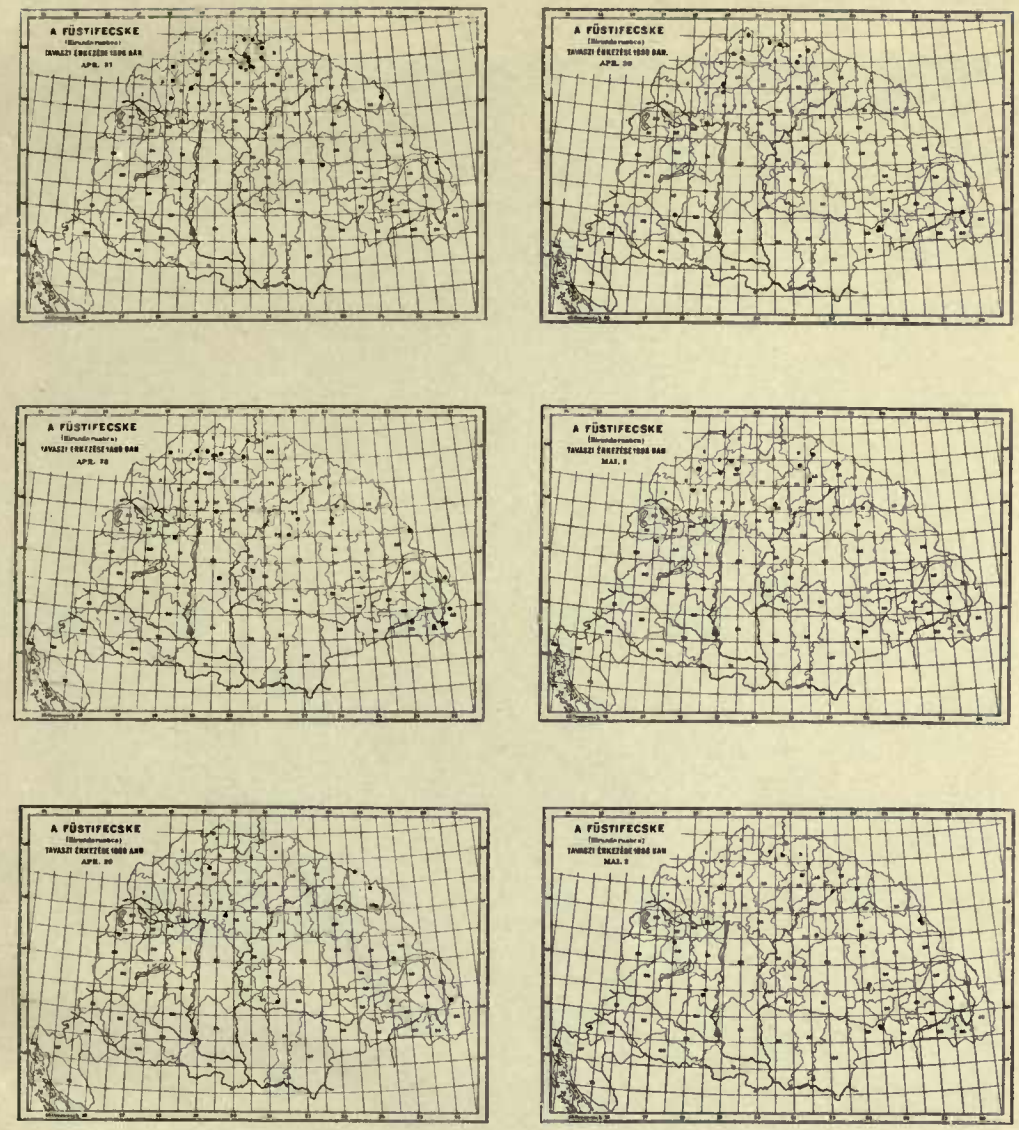
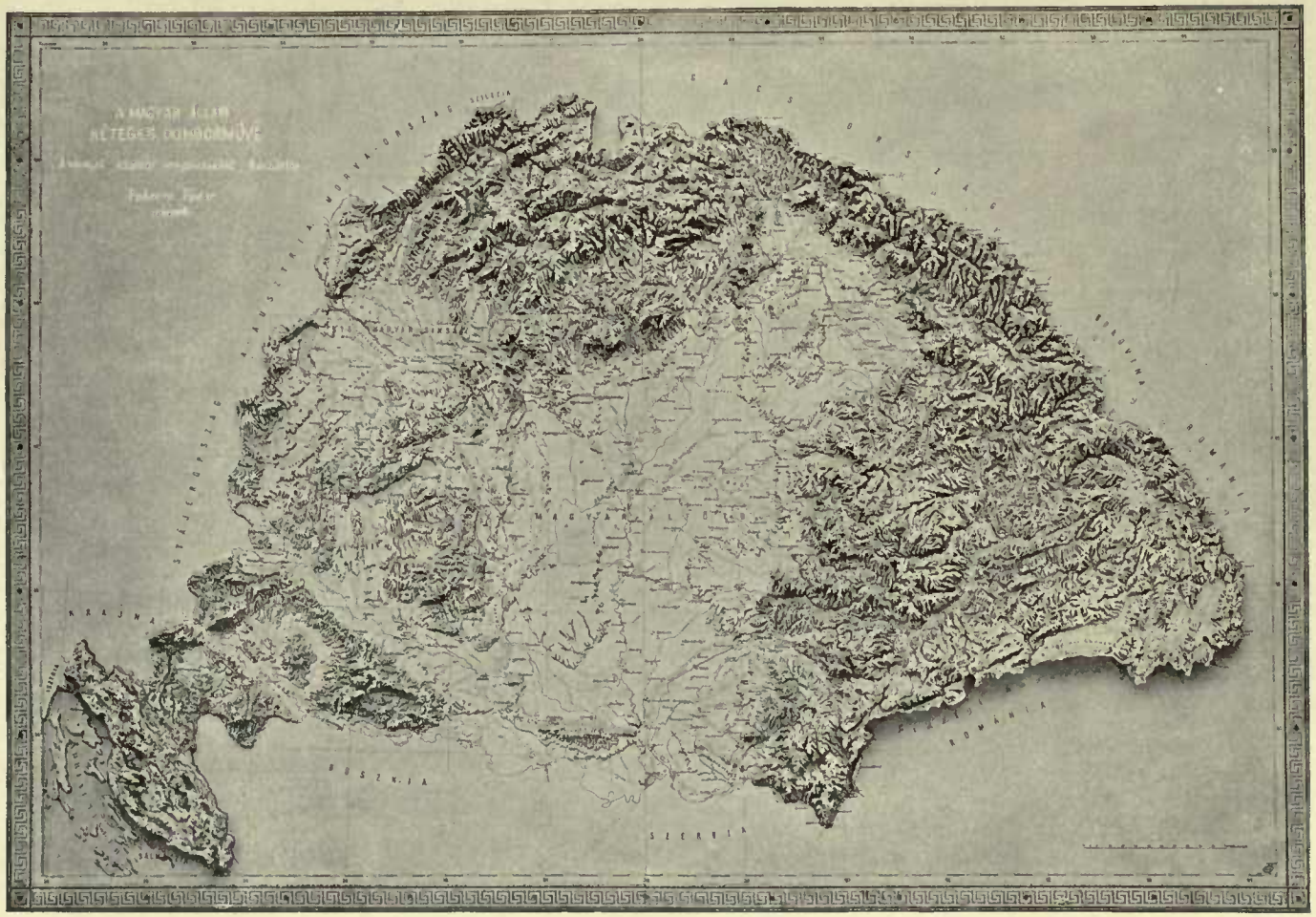


Spring Migration of the Ch. Swallow. 1898.



OROGRAPHICAL MAP OF HUNGARY.

A

A) THE FOUR REGIONS.

- *C Croatia*
- I *Planities*
- II *Regio Pannonica*
- III „ *Transsylv.*
- IV „ *Septentr.*

1. Ch. Swallow.

4. Stork.

2. Wagtail.

5. Woodcock.

3. Cuckoo.

- *Adventus maturus*
- „ *medius*
- „ *tardus*

THE COLONISATION.

Gaylord
PAMPHLET BINDER
Syracuse, N. Y.
Stockton, Calif.

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